Annotated Mid-project Evaluation

Snow and Ice Hydrology (Pakistan)

IDRC File No. 88-8009-CG

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Foreword

The process of project evaluation normally consists of quantitative and qualitative data and information gathering followed by the passing of a judgement on various aspects of the project. To be understandable to the "evaluatees" as well as to the client, this judgement must be formulated with reference to certain benchmarks or standards. Having passed his judgement, the evaluator must then make recommendations to improve or maintain project activities. The evaluation recommendations should be supported by facts as well as by the "state-of-the-art" or common practice.

The least tangible and thus most difficult part of an evaluation is the assessment of the qualitative and quatitative data and information and its translation into recommendations. To satisfactorily achieve that, the evaluator needs analytical and inquisitorial skills, empathy, insight and basic knowledge of the subject of the evaluation.

It is our opinion that the Mid-point Evaluation of SIHP-II falls short of expectations. Therefore, the ultimate purpose of this annotation exercise is to document our thoughts and lessons learned through several iterations and critiques of the evaluation report during its development. Recommendations and guidelines useful to BCHIL and WAPDA are included for the design of the second half of SIHP-II.

The original evaluation report was submitted to IDRC by Dr. Leo G. Wynnyckyj of LGW Consultants Ltd. and the annotations were prepared by the undersigned. Dr. Wynnyckyj's original text, from his final report, was imported electronically into this document and left unedited, except for the Table of Contents, the format and layout. Typos and errors in the original text were not edited. The Table of Contents needed to be adjusted to include this Foreword and current page numbers. The format and layout needed also some adjustment to fit in this type of IDRC document and to receive our comments. Our comments are inserted where appropriate in shaded text boxes.

We trust this document will be useful to the BCHIL and WAPDA team.

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Nancy George, EdD, Training Advisor

Ottawa and Nairobi
March 1994

Acronyms

BCHIL	British Columbia Hydro International Limited
CIDA	Canadian International Development Agency
GOP	Government of Pakistan
IDRC	International Development Research Centre
MCC	Meteor Communications Corporation
MGC	Memorandum of Grant Conditions
PMD	Pakistan Meteorological Department
SIHP-II	Snow and Ice Hydrology Project - Phase II
UBC	University of British Columbia
UIB	Upper Indus Basin
WAPDA	Water and Power Development Authority of Pakistan

Section 1: Executive Summary

The Report presents the findings and recommendations of the "Mid-Project Evaluation" of the "Pakistan - Snow and Ice Hydrology Project - Phase II (SIHP-II)", which was to focus on the effectiveness and efficiency of the management of the Project and identification of possible needs regarding restructuring of the Project.

The SIHP-II Project is funded by CIDA and implemented by IDRC. IDRC's main contractor BCHIL is responsible for conducting the main activities of the Project, including project management, technical assistance and training, all aimed at strengthening the Project beneficiary's (WAPDA's) capability in water resource management by improving flow forecasts from the Upper Indus Basin (UIB).

BCHIL's implementation activities on the Project began in January 1991. By June 1993 considerable headway was made on the Project in terms of efficiency of implementation of each component in terms of schedule and budget. Project design had been completed, three test installations were made; reconnaissance for eight stations had been completed; Meteor Burst system and test installations were completed. Field and on the job training was provided to WAPDA staff.

Data preparation for hydrological modelling and hydrological modelling commenced in November 1992. Preliminary results on calibration of three basins indicated UBC model can be used for the hydrological modelling. However, BCHIL reports also indicated that reliable calibration will be achieved only with six to eight years of data. Further data gathering and model calibration will be required before forecasts can be provided with sufficient confidence to ensure improved system operation. It is estimated that it will require several years of operation of the remote data gathering system and hydrologic model before the data base is sufficient and operators will be sufficiently skilled to fully utilize the improved volume forecasts for the operation of the reservoirs.

The foregoing indicated that in order to realize the potential benefits of the proposed system there must be realistic expectations on behalf of the users and a well trained and knowledgeable WAPDA staff providing the required information and are capable to improve the data base over time.

The Evaluator recommends that IDRC and WAPDA take appropriate action to request CIDA to extend the project duration or consider the formulation of a new Project - SIHP - Phase III, which would build on the enlarged data base and continue to improve the management of the water resources of UIB but also improve the overall management capability of WAPDA.

In relation to the improvement of the management of WAPDA's technical and management capability the Evaluator recommends that IDRC and BCHIL in cooperation with WAPDA put

additional emphasis and priority on training of the WAPDA team in the operation of the forecasting system with emphasis on the following:

a. Adequate "hands-on" training in electronic maintenance procedures for both DCP and the Master Station operators;

b. Upgrading of computer literacy and competence of all officers in SIHP-II, particularly in the application of C++, Basic, Lotus 123, to specific requirements of SIHP-II;

c. Upgrading of skills and practices in the management and use of the UBC watershed model;

d. Upgrading of human resources management skills among the managerial staff and the Train-the-Trainer capability of the WAPDA management team (i.e. motivation, team building skills);

The Evaluator recommends that the End-of-Project Evaluation of the SIHP-II should have as its primary focus the recommendations dealing with training and project extension into Phase III.

We find that, generally speaking, the recommendations summarized in this Executive Summary are not supported by an in-depth analysis of what moves or should move the project. Elaborate comments are found in the appropriate sections of the main report.

Furthermore, the recommendations are silent on the main aspects of the Terms of Reference, including the complementarity of BCHIL's implementation strategies to WAPDA's capability to sustain the system, BCHIL's efficiency and cost-effectiveness of implementation, WAPDA's capability to absorb the system into their existing structure, and the identification of (and proposed solutions to) any unresolved problems.

Although the Evaluator has a favourable impression of the project, he fails to provide an analysis which probes deep into problems or alleged problems that have arisen in the past or that could arise in the future. When reference is made to these points, it is in response to detailed criticism of earlier report drafts; the response generally was to copy almost verbatim comments or suggestions we made.

IDRC Comments on the Executive Summary.

Section 2: Introduction

2.1 Terms of Reference

This report presents the results of the Mid-Project Evaluation of the "Pakistan -Snow & Ice Hydrology Project - Phase II" (SIHP - II); (IDRC File 88-8009); As per "Terms of Reference" (See Appendix A) the purpose of the mid-point evaluation was to focus on the effectiveness of the implementation process in ensuring that the project objectives are achieved.

Of particular interest to IDRC was the question of operational and institutional sustainability and the following specific objectives of this evaluation:

a. The degree to which the BCHIL's implementation strategies for each project component complement WAPDA's capability to sustain the forecasting system at the project's completion, and within this assignment;

b. The relative timeliness and cost-effectiveness of BCHIL's implementation strategies for each project component;

c. The cost-effectiveness of BCHIL's management practices in their implementation of the project;

d. The extent to which WAPDA's current operational and institutional infrastructure will support the operation of SIHP-II's new flow forecasting method;

e. Any unresolved problems encountered in the project implementation to date; and

f. Where necessary to suggest remedial action and/or restructuring of the project implementation to overcome existing problems (within the existing budget envelope).

2.2 Evaluation Methodology and Procedures

The Evaluator's exposure to Pakistan - SIHP-II was gained in a number of ways, which included the following:

a. Meetings with IDRC Project Manager (IDRC Senior Programme Officer) and other members of IDRC , to discuss the Terms of Reference and the Work Plan (See Appendix B);

b. An examination of IDRC and CIDA files and background documents including: Contribution Agreement, Management Plan, WAPDA MGC, BCHIL Contract, IDRC Progress and Mission Reports, BCHIL and WAPDA Reports, and other background documents;

c. A three week mission to Pakistan and interviews with representatives of GOP, WAPDA and BCHIL and other persons with background knowledge of the Project to obtain supporting information and identification; This included interviews and discussions with both senior and junior WAPDA staff members and receipt and review of completed "Interview Guide" questionnaires. (See Appendix "B", Form "A")

We would like to recall here the discussion held in Lahore in the Project Director's Office between the Evaluator and all Senior Project Managers from BCHIL, WAPDA and IDRC.

Everyone in WAPDA and BCHIL pointed out to the Evaluator the serious limitations in the administration of a very open-ended questionnaire to WAPDA's junior project staff and warned that the data thus obtained would not be reliable at all. They correctly pointed out to the misleading information obtained in just such a way by one of the Training Consultants assembling background information for the Training Plan.

Alternative methods to get information were suggested but, in spite of all the advice, the Evaluator dug in and insisted he needed to proceed in that way.

The discussion is documented in reports No. IDRC.22 and IDRC.23.

IDRC Comments on 2.2c.

d. Attendance of a Project Review Committee meeting in Lahore and interviews with participants;

e. In consultation with IDRC establishment of standards for assessment of efficiency of implementation in terms of schedules and budget;

These standards were never established. See Section 6.

IDRC Comment on 2.2e.

f. Assessment of BCHIL's existing personnel and cost control systems for SIHP-II; This included review and discussions of findings, recommenda-

tions and data of BCHIL and WAPDA progress reports and IDRC monitoring and other reports.

We strongly disagree that "*review ... of findings, recommendations and data of BCHIL and WAPDA progress reports and IDRC monitoring and other reports*" constitutes "*assessment*". This "*assessment*" is not documented or even justified, other than by inserting portions of other reports into this evaluation.

IDRC Comments on 2.2f.

g. Assessment of existing operational and management systems of BCHIL and WAPDA and the environment in which SIHP-II has to operate;

h. Assessment of the technology adoption by WAPDA staff and of the point which must be reached to ensure sustainability in both operations and planning;

i. Generally, information was gathered by:

- Interviewing;
- Observation;
- Questionnaires (See Appendix to WORK PLAN)
- Review Files, Records, Reports.

Missing are assessments of

- existing operational and management systems of BCHIL and WAPDA and the environment in which SIHP-II has to operate

- the techhnology adoption by WAPDA staff and ... [establish] the point which must be reached to ensure sustainability in both operations and planning

One of us thinks he saw the Evaluator in an attempt to assess the skill level of selected project personnel, but that assessment seems not to have been recorded or even alluded to or extrapolated from in the evaluation itself.

IDRC Comments on Sub-section 2.2 (Boxes above and below).

We find difficult to believe that what is described in the above Sub-section as methodology has informed the report herein annotated, since none of the supporting evidence or conclusions have been included. It appears as though some items have been transposed right out of the Terms of Reference into this Section without explanation or elaboration.

2.3 Acknowledgements

In the process of data gathering the Evaluator had the opportunity to interview some 40 persons with background knowledge of the Project (in Canada and in Pakistan) whose names are contained in Appendix C and who deserve grateful acknowledgement for their earnest cooperation and assistance in the conduct of the evaluation.

Section 3: Overview of the Project

3.1 Project Background

Pakistan-Snow and Ice Hydrology Project - Phase II (SIHP-II) is funded by Canadian International Development Agency (CIDA) and implemented by International Development Research Centre (IDRC). The overall responsibility for management of CIDA inputs to the Project rests with IDRC. However, for more effective coordination and management of technical inputs to the Project IDRC has contracted British Columbia Hydro International Limited (BCHIL) as its Executing Agent.

Water and Power Development Authority (WAPDA) is responsible for the implementation of the Project in Pakistan with assistance of BCHIL. IDRC has signed a Memorandum of Grant Conditions (MGC) with the Government of Pakistan (GOP) and the Project is to be implemented in accordance with a Management Plan, prepared jointly by CIDA, IDRC, BCHIL and WAPDA.

Considerable amount of work applicable to Snow and Ice Hydrology Project has already been carried out as part of the IDRC funded SIHP-Phase I - research project - (1985-89), which has been implemented by WAPDA with the assistance from Wilfred Laurier University of Waterloo, Ontario, Canada.

3.2 Hydrology of the Upper Indus Basin (UIB)

Pakistan is located in a warm temperature zone. The climate is generally arid with hot summers and cool or cold winters, and wide variations between extremes of temperatures at given locations.

Weather patterns control the timing and distribution of precipitation both as rainfall and snow. They also control the timing of the melt from both snow and glacier ice. Hence, they provide the inputs to the source of runoff for the UIB and must be understood in order to be able to forecast accurately, on a short term and seasonal basis.

Analyses of the UIB streamflow data reveal that there are four major components to runoff: snowmelt, glacier melt, rain and the routed components of these three sources which appear as ground water. There is also a significant loss due to evaporation.

3.3 Project Objectives

The goal of the project is to accrue the interest of self-sufficiency and income generation through water availability and power generation.

The project objective is to improve (strengthen) water resources management capability of WAPDA in the context of UIB.

The SIHP-II is designed to install a network of remote sensing stations, each equipped with sensors to measure precipitation temperature, relative humidity, wind speed and direction. The sensor data will be transmitted to a central receiving station located near Lahore, and from there to a data processing centre, where the data will be used to generate 10-daily and seasonal flow forecasts.

3.4 Specific Objectives and Methodology

According to the Project Management Plan, the project is to improve the water resources management capability of WAPDA in the context of UIB. This is to be accomplished by establishing and operating an effective ice and snow runoff monitoring and forecasting system. More specifically the Project was initially to:

1. Determine the stream-flow forecasting needs of WAPDA for the UIB;

2. Examine suitabilities and deficiencies of seasonal and short-term stream-flow forecasting models as a function of WAPDA's operational needs;

3. Select the best available model for stream-flow forecasting that will be adapted to meet the WAPDA requirements.

   On the basis of the above, the Project was to:

4. Expand the existing hydrometeorlogical network to the high altitude snow-covered glacial areas;

5. Install, after proper testing, a communication system for rapid and reliable transmission of hydrometeorlogical data to operational runoff forecasting centre(s);

6. Upon determination of positive benefits, install equipment necessary for recording, transmission, reception, and analysis of data for runoff forecasting purposes;

7. Establish procedures for the estimation of seasonal precipitation, snow and glacier-ice melt and rainfall run-off;

8. Establish procedures for estimating the seasonal and short-term run-off volumes arising from snowmelt, ice melt, and rainfall by calibrating and testing computer models for the catchments upstream of: the mouth of the Kabul River, the Indus River at Tarbela, and the Jhelum River at Mangla;

9. Continue some of the applied hydrological research activities initiated at Phase I(SIHP-I) for their integration into the proposed forecasting system;

10. Train WAPDA personnel in all phases of the Project so that upon completion they will capably operate, maintain and modify the system, as required, without further external aid assistance; and

11. Establish strategies for reservoir operation as a function of scenarios developed by the hydrological model.

The Project strategy and methodology outlining all the activities to be carried out during the implementation of the Project was prepared by BCHIL and IDRC and submitted to CIDA.

Section 4: Evaluation of BCHIL's Implementation Strategy and Results

4.1 Implementation Strategy and Achievements and Non-Achievements

BCHIL's management practices in the implementation of the project in terms of timeliness and cost effectiveness have been generally well coordinated.

BCHIL's implementation activities on the Project began in February 1991. By June 1992 the first three objectives of the project listed above were achieved. Among other positive achievements were the following: project design, including the selection of a transmission mode had been completed; test installations were made in the Himalayas and Karakoram mountains; reconnaissance and heavy civil work had been carried out for sixteen stations. Procurement of vehicles, field equipment for personnel, the Meteor Burst system and test installations were completed. Also specifications had been prepared for the purchases of remaining sensor stations. Field and on-the-job training was provided to WAPDA staff in testing and installing equipment for remote sites, reconnaissance, data decoding, hydrological model calibration and other design aspects of the project.

Field installation progress during 1992 was sufficient to ensure timely implementation of the remote sensing systems and hydrological model, although some delays and modifications to the original 1992 field programme had to be accommodated due to sectarian unrest in Northern Pakistan, which rendered access to these areas hazardous for non-residents. As a result, the reconnaissance was completed only at seven sites in the Swat/Chitral sub-basins, which were not affected by the violence (of the originally fourteen sites planned).

What precedes is essentially a summary of the 1993 semi-annual report submitted to CIDA by IDRC (No. IDRC.21), not the result of an in-depth evaluation. A direct quote from that progress report follows.

IDRC Comments on Sub-section 4.1 to Date.

According to IDRC Report No 21 (July 1993) during the period January-June 1993 the more important achievements of the BCHIL Team were the following:

a. the preparation of the 1993 schedule to enable a better control and monitoring of project activities;

b. continuation of the regular twice-monthly meetings of WAPDA Section Heads (initiated by the IDRC - Site Manager) which had improved overall coordination and progress of project work;

c. the transfer of most of BCHIL reporting activities from Canada to Pakistan in line with the planned shift in project work;

d. the delivery and installation of the Meteor Burst communications system - a site was selected for the master station, a building constructed, the hardware shipped and installed, and the system put into operation;

e. the preparation of materials for the remote stations - towers for eleven new sites were manufactured, shelters were modified to accommodate Meteor Burst electronic equipment, precipitation gauges were designed and manufactured (by Pakistani suppliers) and civil works completed at two new sites;

f. more materials were purchased, the major items included the Meteor Burst communications system, four computers, a diesel generator, scaffold towers, instrument enclosures, precipitation gauges, land for the Master Station site and material to construct building; and

g. the project expenditures to date at June 1993 at $3,076,704 were on budget and well within the total estimated expenditures of $4,245,000.

Data preparation for hydrological modelling was carried out and hydrological modelling commenced in November 1992. Practical training on the model was also initiated at that time and preliminary calibration results on three sub-basins indicated that the UBC watershed model can be successfully used for the hydraulic modelling of the UIB. According to BCHIL's "Project Direction and Review Report" (February 1993, p 41) upon completion of the SIHP-II, although a conceptual hydrological model will have been calibrated for the UIB, the data base will be insufficient to ensure a reasonable calibration. Further data gathering and model calibration over a period of additional 3 to 5 years will be required before forecasts can be provided with sufficient confidence to ensure improved system operation. It is estimated that it will require several years of operation of the remote data gathering system and hydrologic model before the data base is sufficient and operators will be sufficiently skilled to fully utilize the improved volume forecasts for the operation of the reservoirs.

Major training activity was the drafting and finalization of a Training Plan. Although the final Training Plan was not released until the end of June 1993, training activities that were in general agreement with the draft were conducted. These included the delivery of the course on the operation of the Meteor Burst System by MCC in Kent, Washington; a tailored course in D-Base III; a course on the computer language C; instruction on the handling of sensors, their calibration and installation; and the "train-the-trainer"

instruction for seven of BCHIL Project staff and consultants who provide training. One Pakistani student entered the final year of his MASC program at UBC. Two other candidates were identified and have applied for entry to UBC.

There was a generally positive assessment by the trainees and their supervisors of the value and relevance of training received. Among the non-achievements of the training effort was the fact, that five (5) members of the WAPDA team at the sub-engineer level, who were interviewed by the Evaluator, felt that the training effort was not satisfactory, since only higher ranked officers were being selected for training by the BCHIL Team, and the lower ranks were deprived of the opportunity. In fact these reactions were submitted to the Evaluator in a written form answers to questions 1.1d, 1.2.d., and 2.6 and 2.7 of the Interview Guide (See Appendix "B" - Annex "A" and Appendix "D").

Although the Evaluator notes the disappointment of the sub-engineers, who clearly have other expectations from the training component of the project, he did not expand on the context, potential misunderstandings and/or interviewees' expectations — and whether, in his assessment, theses expectations are realistic. His observation is something relatively new that should have been probed deeper.

For instance, the Evaluator never noted that the Training Plan had not been distributed to target trainees as originally intended. He also did not note the uneasiness about the presentation or the wording of the Training Plan. We noted these problems at the time of our visit in October, while the Evaluator was in Pakistan. See Report No. IDRC.22 and what should have been recommendations of the Evaluator have been proposed as activities in Report No. IDRC.26.

In summary, we recommend that a series of residential workshops and customized training design take place. A decision on the availability of funding should be taken soon.

IDRC Comments on the Last Paragraph of Sub-section 4.1.

4.2 Directions for the Future

The Evaluator has examined the progress and results of the joint effort of BCHIL and WAPDA in establishing and operating an effective Ice and Snow Runoff Monitoring and Forecasting System and makes the following recommendations for action by BCHIL Team:

1. It is recommended that BCHIL continue to put a high priority on the development and implementation of a training program necessary for

WAPDA to successfully develop and operate a water management system for the UIB. The program must identify WAPDA's needs and identify the WAPDA personnel to be trained; provide a detailed training schedule for each person to be trained, including the type of training, material to be covered, the timing, and who is to do the training and where; the costs, the degree or level of qualification and other relevant detail.

2. The Evaluator recommends that IDRC and BCHIL in cooperation with WAPDA put additional emphasis and priority on training of the WAPDA team in the operation of the forecasting system with emphasis on the following:

   a. Adequate "hands-on" training in electronic maintenance procedures for both DCP and the Master Station operators;

   b. Upgrading of computer literacy and competence of all officers in SIHP-II, particularly in the application of C++, Basic, Lotus 123, to specific requirements of SIHP-II;

   c. Upgrading of skills and practices in the management and use of the UBC watershed model;

   d. Upgrading of human resources management skills among the managerial staff and the Train-the-Trainer capability of the WAPDA management team (i.e. motivation, team building skills);

> The Evaluator lifted these recommendations directly from a series of comments that we made to him. He dropped a few of the items we thought important.
>
> These recommendations form the basis for the proposal contained in Report No. IDRC.26. That document gives supporting background.

IDRC Comments on Point 2. of Sub-section 4.2.

SIHP-II is, in principle, a simple project. Its execution however is relatively complex due to the logistics and due to the human resources development needed.

BCHIL's implementation strategy has many facets which have not been fully explored by the Evaluator.

in General

- systematic involvement of WAPDA staff in all aspects of the project
- documentation of all design studies, reviews and field work
- local procurement of harware
- bi-weekly management meetings at WAPDA

in the Field

- provision of system redundancies and spares
- reliance on WAPDA for the staging of field work
- use of a guest house for Canadians
- scheduling and planning in participative sessions

for Training

- use of a Training Plan

We will not detail the impacts of each one as the Evaluator should have done. Assuming the BCHIL and WAPDA Project Manager and Director know the details, we jump ahead to our conclusions.

By and large, the implementation strategy is effective. WAPDA appears satisfied. Major shifts in strategy are not warranted. As per the recommendations of our Report No. IDRC.26, BCHIL should fine-tune

- the English documentation for Urdu speakers
- bi-weekly meetings by determining their effectiveness
- the application of the Training Plan
- the use of incentives to further motivate WAPDA staff (training, travel, information sharing, etc.)

Finally, recent months have seen increased emphasis on training related to computer modelling. We strongly encourage further strengthening of this emphasis. Also refer to comments in Sub-section 5.1.

IDRC Comments on Section 4.

Section 5: Evaluation of WAPDA's Operational Environment and Objectives of SIHP

This title does not correspond to the contents of the Section. To properly evaluate this subject, issues relating to geography, local politics, available infrastructure, corporate culture, management of personnel, career paths, conditions of service, budgeting, etc. should have been examined and discussed.

IDRC Comment

5.1 The Technology Transfer and WAPDA's Commitment to Training

Water for agricultural irrigation and electricity generation plays a vital role in the economy of pakistan. Existing reservoirs in the UIB are used to accumulate water during periods of abundant flow for conservation and distribution. This is one of the principal responsibilities of WAPDA.

WAPDA recognized the need to improve its water management system and contribute to improved agricultural production and hydro-electric power generation. It also recognized that improved data on the glaciology and hydrology of UIB as a basis for improved flow forecasting was the key element in support of improved water management.

The first project which provided WAPDA with assistance to improve its water management capability was funded by IDRC and was carried out in cooperation with Wilfred Laurier University of Waterloo, Canada. Phase I of SIHP (1985-89) provided the applied research on the high altitude hydrology of UIB. Phase II of SIHP provides the continuing involvement of IDRC in the overall management of the project and sub-contract for BCHIL to provide close collaboration with WAPDA in all phases of the project.

The project will install remote sensing stations, each equipped with sensors to measure snow accumulation, precipitation, temperature, solar radiation, relative humidity, wind speed and wind direction. The sensor data will be transmitted to a data processing centre in order to generate 10-daily and seasonal flow forecasts, all involving the application and use of technology new to pakistan, and therefore training and knowledge transfer will be the key element of the technical assistance which is to be provided by BCHIL team

Clarification: SIHP was not designed to provide WAPDA assistance to improve its water management capability (although this was admittedly the long term goal) nor was it originally designed in phases.

Another clarification: SIHP, even though initially conceived by Wilfrid Laurier University, was designed and carried out jointly by both partners. The project was part of IDRC's collaborative research program which supported Canadian researchers working with their developing country colleagues.

IDRC Comments on the Third Paragraph of this Sub-section.

to the WAPDA team, in order to achieve the objectives of the project.

The Evaluator's interviews with members of the WAPDA and BCHIL project teams in pakistan provided a very positive impression from both the WAPDA and BCHIL team members views and approach to training. WAPDA members viewed the training aspects as a joint effort how to master the new computer based technology in getting improved data on the water/power management aspects and to do it in a hands-on, job related fashion, working together with their BCHIL friends.

BCHIL team representatives felt that the "Training Plan" as approved on June 7, 1993 was a well designed program and should be implemented; that the actual training, should be as possible part of the on-going work plan. This way it would not only concentrate on the work that must be done but also achieve the training results in the process.

The dynamic tension between training/managing people and acquiring/installing equipment has emerged as a major issue in project implementation. The challenge now is to move to operationalize the training plan and to improve the management capability of WAPDA key management personnel and decision makers. [see Comment Box below]

5.2 Directions for the future

The Evaluator has examined the progress and results of the WAPDA team effort to respond to the BCHIL's team's efforts to design and implement an operational strategy for UIB. It should be kept in mind, that upon completion of this project (even at the extended date of 1996) although a conceptual hydrologic model will have been calibrated for UIB, the data base will continue to be insufficient to ensure a reasonable calibration. Further data modelling and calibration over a period of 3 to 5 years will be required before forecasts can be provided with sufficient confidence to ensure improved system operation. This must be recognized by WAPDA and they must be prepared to continue development work to reach its final objective.

The comments of this last paragraphs stand out like a sore thumb; not because they are incorrect, but because they were lifted from our comments and are thus devoid of context and substantiation in this report.

There are numerous indicators of this dynamic tension between training/managing people and acquiring/installing equipment:

- the initial almost exclusive concentration on activities related to hardware/technology acquisition and installation;
- the concentration on visible, tangible components of the project to provide achievement benchmarks for progress (e.g. equipment purchase and acquisition, civil installations);
- the understandable expectations of BCHIL Managers, at least initially, that contract performance will be measured on the *visible and tangible* (operating stations, operational model, etc.) rather than less obviously visible and tangible indicators (trained staff, effective systems and planning procedures, cohesive team spirit and project vision, active and energetic staff commitment to value of project, etc.);
- the apparent lack of individual initiative among the more junior WAPDA staff members to practise (or even acquire) skills necessary for the data management aspects of the project (for which there is no perceived visible and/or immediate reward);
- the absence of a sense of project-related urgency among the SIHP staff at the conclusion of the field season (i.e. when equipment or hardware-related activities are in hiatus).

IDRC Comments on the Last Paragraph of Sub-section 5.1.

The UBC model was calibrated for the Mangla Basin and was used for three years. It is not used now because of unrealistic expectations, lack of understanding of the model inputs, insufficient training and insufficient data.

The foregoing indicates that in order to realize the potential benefits of the proposed system there must be realistic expectations on behalf of the users and a well trained and knowledgeable WAPDA staff providing the required information and are capable to improve the data base over time.

The Evaluator recommends that IDRC and WAPDA take appropriate action to request CIDA to extend the project duration to the end of the year 2,000 or to consider the formulation of a new project - SIHP - Phase III.

The present project SIHP-II should proceed as planned to install hydrometeorlogical data stations, install and calibrate the hydrologic model, and develop a preliminary operating strategy for Tarbela and Mangla reservoirs. The future project (SIHP-III) would build on the enlarged data base to continue to improve the management of the water resources of the UIB but also improve the overall management capability of WAPDA through additional training and improved management skills and information systems of WAPDA decision makers.

To dismiss the previous attempts at introducing the UBC Watershed Model in one sentence of sweeping unexplained generalizations, and then use that sentence as the justification for extending SIHP into a third phase is extremely unhelpful. If the lack of success of the previous application of the UBC Model is to be introduced into this evaluation, each of the perceived shortcomings should have been analysed and its relevance to this current project carefully articulated.

Furthermore, to support such an extension of the project on the basis of an anticipated need for hand-holding is not only premature but also a vote of non-confidence in the anticipated effectiveness of the Training Strategy.

Long-term hand-holding has never been an effective solution in any development project. Successful projects encourage self-reliance.

IDRC Comments on Sub-section 5.2.

Section 6: Other Issues and Concerns/ Reference Standards

In relation to other relevant issues and project concerns the following reference standards should be kept in mind:

a. Progress toward achievement of project objectives;
b. Provision of project resources in a timely manner;
c. Proper coordination of work done by BCHIL and WAPDA team members;
d. Project schedules and budgets are met/achieved.

Appropriate reference standards for evaluating a project include other concepts. The management of public funds involves more than being on budget and on schedule.

- **Progress towards Objectives**: project objectives always evolve with time as situations change and as more information becomes available. Does the team have in place mechanisms for an on-going review of the objectives? How is that taken into account in detailed planning? Is the target constantly shifting?

- **Meeting Schedules**: realistic schedules include contingencies for uncontrollable factors and appropriate allowances for routine activities

- **Meeting Budgets**: budgets can be inflated. Remaining within an inflated budget does not guarantee efficiency and cost-effectiveness. Also, significant variances on line items could reflect a certain degree of mismanagement. What are proper ratios of management to technical assistance expenditures? The United Nations figures that 13 % of project costs (equipment not included) goes to administration. Should IDRC and BCHIL not be guided by that?

- **Providing Resources in a Timely Manner**: are we talking here of human resources or of financial resources? One could provide overqualified staff to a project in a timely manner but resources would not be optimally used

IDRC Comments on Reference Standards.

6.1 Efficiency of Project Implementation

Despite some delays in the implementation of some planned activities (only five sites were installed in 1992, rather than the planned six sites) a number of changes in the management of the project by the BCHIL/WAPDA teams had definite positive effects. Regular meetings of Section Heads, initiated by the Site Manager, continued to be held twice monthly, to ensure adherence to the schedules and budgets. At the end of June 1993 the project had achieved all major targets set by the project review committee in October 1992.

A project Training Plan was finalized; land for the Master Station was acquired and a building constructed; the Meteor Burst communications system was installed; the sensors for all stations were purchased, delivered and tested; eight new station sites were identified; among the non-achievements was the modelling activity which had fallen behind schedule and alternative approaches to accelerate the process of calibration were being evaluated. [see Comment Box on page 31]

6.2 BCHIL's Cost Control System - cost control refers to the ability of responsible managers to keep the operating costs within planned levels and to develop ways and means to get higher productivity at planned operating cost levels. The actual+forecast costs of BCHIL project operations at $4,245,000 are estimated to be lower than original budget amount of $4,249,000 by $4,000. The variances in expenditure components are estimated as follows:

	budget	actual (+forecast)	variance
fees + expenses	$2,743,000	$2,644,000	$99,000
equipment	1,331,000	1,422,000	(91,000)
training	175,000	179,000	(4,000)
	$4,249,000	$4,245,000	$ 4,000

the increase in equipment costs is due to purchase of some unplanned tools and equipment which was offset by lower expenditures on some technical assistance work. Training expenditures are forecast to be higher than budget to respond to the increased needs. [see Comment Box on page 32]

6.3 BCHIL's Reporting - Most of BCHIL's reporting activities have been transferred from Vancouver to Lahore, in line with the general shift of project activities from Canada to Pakistan, when the Site-Manager was posted to Lahore.

The Project Management Assistant provides the necessary assistance to the Project Manager and Site Manager in the report preparation, and there has been a general improvement in the timing of the report availability in 1993 compared to prior years.

This section does not address the issue of efficiency.

One of the main aspects of efficiency is the provision of staff with appropriate qualifications to various proiect positions. BCHIL has appointed many senior staff members to the project and many tasks which could be performed by more junior staff, with lower charge-out fees, are being carried out by this senior personnel.

While there is no major problem there, earlier Project Monitor and Evaluator (Project Direction and Review) raised the issue on several occasions — this was pointed out to the Evaluator. It was also discussed at the 1992 PRC. The Evaluator should have finally put this issue to rest.

The over-qualification of personnel for certain tasks constitutes an advantage for training in Pakistan, provided there is a good training strategy in place.

BCHIL has also taken steps to identify highly qualified but more junior staff to be on the team. This is partly how Renata Adamcik, Catherine Roome and the yet-to-be-designated new Site Manager got involved. We encourage a continuation of this policy.

"Efficiency" in relation to the training component of the project demands evidence of the *application of learning in addition to attempted transfer of skills*. It is insufficient to put people through the motions of training and conclude that they are therefore capable of skilled application of that training. To date there is evidence of severe inefficiency in training, in that the opportunity to refine and internalize acquired skills has been missing from the project implementation plans.

One illustration of BCHIL's increasing awareness of the necessity to apply and operationalize newly acquired skills was their decision to retain Danyal Hashmi in Vancouver to practise his theoretical knowledge base in a practical setting under the guidance of Heiki Walk, the BCHIL Intermediate Hydrologist and model specialist, before he returned to Pakistan after completing his studies at UBC.

IDRC Comments on Sub-section 6.1.

The 1992 Annual Report was submitted in March 1993, followed by the Quarterly Financial Report. Monthly Highlight Reports were prepared at the end of each month. In June 1993 a number of manuals were provided, which included: BCHIL - Senior Information Manual; MCC Systems Manual; MCC-550C Operations and Maintenance Manual; and MCC-520B Operations and Maintenance Manual.

These data do not reflect an evaluation. Considering the ratios

13.6 % Administration to Technical Assistance without the Project Manager's time on administration

3.1 % Procurement to Equipment in actuality larger because of professionals' time charged against design activities

We recommend that the administrative costs be lowered as much as possible. The current ratio does not grossly exceed reasonable limits but needs monitoring.

The Evaluator did not address the adequacy of the parallel activity tracking for project management.

IDRC audited the cost tracking system in the first year of the project and found it adequate.

IDRC Comments on Sub-section 6.2.

6.4 Management Systems - BCHIL and WAPDA - The joint efforts of the BCHIL and WAPDA teams have resulted in the activation of the existing organizational and management systems of both BCHIL and WAPDA. BCHIL's Project Director, Site Manager and Project Manager Assistant provided general direction for the project. WAPDA'a Project Director, assisted by two senior engineers, two junior engineers, three research officers, and a number of sub-engineers and research officers from the WAPDA Hydrology Research Directorate, are members of the WAPDA team.

Meetings were held once or twice per week between the WAPDA Project Director and BCHIL site manager to address issues of immediate concern and to provide liaison between BCHIL and WAPDA with new emphasis on knowledge transfer and training. The Project Director attended regularly bi-weekly meetings of the section heads and meetings of the Management Committee, comprised of Project Director, two Senior Engineers and Site Manager.

6.5 BCHIL's Cross-cultural Strategies - One of the more important conclusions of Dr. D.J. Kealey's study of Canadian Technical Advisors Overseas "CROSS-CULTURAL EFFECTIVENESS" was that both knowledge of the local culture and participation in that culture are associated with the overseas effectiveness and transfer of skills and knowledge to national counterparts. In relation to SIHP-II the project manager (Dr. W. Bell) continued to provide general direction and was responsible for over-all project direction and control. The site manager (Mr. Bill Thompson) was on site during the period and

There is no evaluation offered of the management system described. For example, it is unclear whether the Evaluator recommends the system of meetings he describes as being currently in place; there is also silence on whether the participants in these meetings perceive them to be helpful or useful. The existence of meetings in and of themselves does not constitute good management practice; in fact, the proliferation of meetings for their own sake can be extremely poor management practice.

Also, since the bi-weekly meetings are currently convened under the aegis (and stimulus) of the BCHIL Site Manager (a fact that the Evaluator has not mentioned), what strategies does the Evaluator recommend to encourage WAPDA Senior Management to continue these meetings after the departure of the Site Manager, if they perceive them to be useful in advancing the project implementation? This question remains unanswered; however, it will need fairly speedy resolution, since the Site Manager will soon depart.

IDRC Comments on Sub-section 6.4.

provided direction and control at the field level. Project Manager Assistant (Ms. R. Adamcik) spent three weeks in Pakistan during the month of February 1993, and with her assistance WAPDA staff developed an activity schedule for 1993. She also provided the Accounting Dept. of BCHIL and the Site Manager assistance in the preparation of reports. Most of the project reporting activities have now been transferred from Vancouver to Lahore.

The BCHIL team members appear to have established effective relationships with the WAPDA team members and have been generally effective in transferring skills to their WAPDA counterparts.

The Project Management Assistant and a number of specialists are expected to continue to assist WAPDA staff in the preparation of the 1994 AWP and progress reports and to provide liaison between BCHIL and WAPDA in the essential transfer of skills and knowledge through technical assistance and training. [see Comment Box on page 34]

6.6 Adoption of Technology by WAPDA Staff - The joint efforts of the BCHIL and WAPDA teams have resulted in activation and adoption of technology by WAPDA staff. The work which was to be completed in 1993 was to consist of activation of high-altitude instrumentation network, converting the existing three stations to Meteor Burst telemetry, installing sensing equipment at the five stations established in 1992, and installing up to seven new stations. With 15 new stations transmitting data by the end of 1993, the basic element of a forecast system will be in place and operational training can be started. This effort in training is necessary to ensure the continuity of the project, because it will provide WAPDA with essential tools needed to manage the system. The implementation of the training plan, preparation of training documentation will require

The Evaluator did not go far enough in his assessment.

We find that there has been a genuine interest in Pakistan and its culture taken by most BCHIL staff. It is worth mentioning that two BCHIL team members spent their 1993 vacation in Pakistan. This kind of positive attitude towards the country has been conducive to good understanding between the Pakistanis and the Canadians.

During the BCHIL Training-of Trainers workshop held in Vancouver, some time was dedicated to the exchange of ideas and perceptions about functioning in the Pakistani culture. In general, there was a clear admiration of and respect of the Pakistanis expressed by the BCHIL staff who had worked in Pakistan, and that exchange of ideas assisted in strengthening cross-cultural strategies.

Perhaps what remains to be done is to repeat that experience for the Pakistanis — to provide them with further insights into the Canadian culture and the values of the BCHIL staff who come to work with them, not with the intention of "converting" them in any way, but to provide the WAPDA staff with some insight into the Canadian culture from which the BCHIL staff have come.

After all, cross cultural understanding demands reciprocal insight, and the Pakistanis should not be expected to automatically "know" about Canadian culture.

IDRC Comments on Sub-section 6.5.

additional effort by all project staff, not only in 1994 but throughout the rest of the project. It will also provide WAPDA with essential tools and skills to continue to conduct ongoing training of their staff in adopted technology. [see Comment Box below]

The transfer of technology i.e. equipment and hardware does NOT constitute technology adoption as the evaluator seems to assume.

IDRC Comments on Sub-section 6.6.

6.7 Project Extension - Extension of the project by one year to 1996 has been discussed and agreed to in principle by IDRC, CIDA, BCHIL and WAPDA. IDRC will provide necessary contact with CIDA. This will be followed by the GOP request to CIDA on behalf of WAPDA.

6.8 End-of-project Evaluation - It is recommended that the primary focus of the end-of-project evaluation be the implementation of the recommendations dealing with training and project extension into Phase III.

Appendix A: Terms of Reference

SNOW & ICE HYDROLOGY PROJECT - PHASE II (SIHP-II)

TERMS OF REFERENCE
for
MID-PROJECT EVALUATION:

CANADIAN EVALUATOR

FINAL, 24 June 1993

1.0 Background

1.1 General

The Upper Indus Basin (UIB) covers an area of about 264,000 km² upstream of Tarbela Dam and including the Jhelum river system upstream of Mangla Dam. It is located in large parts in a mountainous region which has substantial snow cover as well as extensive glaciers. Between 70 and 80 % of the water flow in the Indus is generated by high altitude snow and ice melt.

Water for agricultural irrigation and electricity generation plays a vital role in the economy of Pakistan. Existing reservoirs are used to accumulate water reserves during periods of abundant flow for conservation and distribution administered by the Water and Power Development Authority (WAPDA).

WAPDA recognized the need to develop a rational system of water management for water distribution that would contribute to improve agriculture production and increase hydro-electric power generation. Data on the glaciology and hydrology of the UIB as a basis for the development of improved flow forecasting become the key element in support of water management.

A first project requested by WAPDA was carried out in cooperation with Wilfrid Laurier University of Waterloo, Canada, with funding by the International Development Research Centre (IDRC). This first phase, known as the Snow and Ice Hydrology Project (SIHP), consisted of a mixture of basic and applied research and was completed at the end of 1989. As it happened, this first research project on the high altitude hydrology of the UIB was carried out simultaneously with at least two other related, but smaller, foreign-funded projects: a physical hydrologic model evaluation supported by the World Meteorological Organization (WMO) and carried out by consultants from the University of British Columbia, and sediment transport research supported by the British ODA and executed by the University of Manchester.

As a follow-up to the first IDRC project, WAPDA approached the Canadian International Development Agency (CIDA) to develop an operational forecasting system using a network of high altitude hydrometeorlogical Data Collection Platforms (DCPs) feeding data continuously into a physically-based computer model at the Flow Forecasting Centre. The information is expected to be more reliable than that produced by the existing statistically-based system.

CIDA approved WAPDA's request and entrusted the overall responsibility for the project management and implementation to IDRC. The implementation of the project was sub-contracted by IDRC to British Columbia Hydro International Ltd. (BCHIL). Under the terms of the sub-contract, BCHIL must work in close collaboration with WAPDA on all phases of the project so that the Pakistanis will be self-sustaining at the end of the SIHP-II. The activities related to the project implementation started in October, 1990.

1.2 Project

The SIHP-II is designed to install a network of approximately 25 remote sensing stations each equipped with up to six sensors to measure precipitation, temperature, relative humidity, wind speed and direction. The sensor data will be transmitted to a central receiving station located near Lahore and, from there, to a data processing centre where the data will be used to generate 10-daily and seasonal flow forecasts.

2.0 Project Description

Project Goal and Objectives

The goal of the project is to accrue the interest of food self-sufficiency and income generation through water availability and power generation.

The project objective is to improve (strengthen) water resources management capability of WAPDA in the context of the UIB.

The specific objectives set out at the beginning were:

a) to determine the stream flow forecasting needs of WAPDA for the Upper Indus Basin;

b) after review of all past work, to examine known and potential seasonal and short-term stream flow forecasting systems as a function of WAPDA's operational needs;

c) to select the optimal solution(s) for stream flow forecasting requirements;

and, depending on the results of the above,

d) to expand the existing hydrometeorlogical network to the high altitude snow-covered and glaciated areas;

e) to install, after proper testing, a communication system for rapid and reliable transmission of mountain hydrometeorlogical data to operational runoff forecasting centre(s);

f) upon determination of positive benefits, to install equipment necessary for reception and analysis of remotely sensed data for runoff forecasting purposes;

g) to establish procedures for the estimation of seasonal snow, glacier ice-melt and rainfall;

h) to estimate the seasonal and short-term runoff volumes arising from snow melt, ice melt, and rainfall by calibrating and testing computer models of the catchments upstream of: the mouth of the Kabul River, Tarbela Dam on the Indus River and Mangla Dam on the Jhelum River;

i) to continue some of the applied hydrological research activities initiated within Phase I [SIHP] for integration into the proposed forecasting system;

j) to train WAPDA personnel in all phases of the project so that upon completion they will capably operate, maintain and modify the system, as required, without outside assistance;

k) to establish strategies for reservoir operation as a function of scenarios developed by the hydrologic model.

Implementation

The implementation of SIHP-II requires the application and use of technology new to Pakistan. Currently the project has four components:

- → Management,
- → Technical Assistance,
- → Procurement, and
- → Training.

The technical assistance component includes:

1) Installation and Maintenance

Installation: A remote sensing site, selected through reconnaissance visits, consists of a scaffold equipped with the six sensors and a shelter for a battery, data logger and Meteor Burst transmitter. Equipment is tested and calibrated in the workshop before installation and reset in the field.

The data will be transmitted to a central receiving station on the outskirts of Lahore and relayed to a data processing centre in town.

Maintenance: Maintenance will consist of annual trips to verify the sensors, replace anti-freeze in the precipitation gauge, replace the battery and faulty sensors.

2) Data Collection, Processing and Interpretation

Data Collection, Storage and Processing: The electronic data received from the field are decoded, verified and regularly entered into a data base. Copies of the data are also put in storage for conservation.

Modelling and Interpretation: Decoded data are used as input to a computer model of the UIB. The steps in the use of the model are: set-up, calibration and application. The model output is a volume of flow which forms the basis for the operations of reservoirs and the allocation of water from the UIB.

To ensure the sustainability of the project, WAPDA personnel require training, the implementation of which is guided by a detailed Training Plan. Training is seen as the most important aspect of the project.

Monitoring

IDRC has the responsibility for monitoring BCHIL's project activities and must report to CIDA following the schedule set out in the SIHP's Management Plan. To assist in this task, IDRC has retained the services of a Canadian Project Monitor and of a Training Advisor. Their Terms of Reference and reports, when applicable, are available at IDRC.

The initial activities of SIHP-II culminated in the preparation of a Project Direction and Review Report which was reviewed by an independent consultant in the Summer of 1992. His review, which approved of the direction and supported the project concept, is on file at IDRC.

3.0 Purpose

The purpose of this assignment is to conduct a mid-point evaluation of the SIHP-II. Rather than the direction and approach to the project, it is the effectiveness of the implementation

process in ensuring that project objectives are met which must be the focus of this evaluation. Of particular interest to IDRC is the question of operational and institutional sustainability. The specific objectives of this evaluation are:

a) to determine the degree to which BCHIL's implementation strategies for each project component complement WAPDA's capability to sustain the forecasting system at the project's completion, and, within this assignment;

b) to review the relative timeliness and cost-effectiveness of BCHIL's implementation strategies for each project component;

c) to determine the cost-effectiveness of BCHIL's management practices in their implementation of the project;

d) to determine the extent to which WAPDA's current operational and institutional infrastructure will support the operation of SIHP-II's new flow forecasting method;

e) to document any unresolved problems encountered in the project implementation to date; and,

f) where necessary, to suggest remedial actions and/or restructuring of the project implementation to overcome existing problems (within the existing budget envelope).

4.0 Appointment and Role of Evaluator

One Canadian Evaluator will be appointed by IDRC. The Evaluator will necessarily travel to Ottawa and Pakistan and submit a report upon his/her return. A visit to Vancouver may also be necessary and the visit to Pakistan should be timed to coincide with the annual Project Review Committee meeting.

4.1 Scope of Work

In conducting this evaluation, in order to achieve the objectives described in 3.0 above, the Evaluator will undertake to

- be briefed in Ottawa by the IDRC Senior Programme Officer responsible for the SIHP-II (also sometimes referred to as IDRC Project Manager);
- review all the relevant reports and technical documents on file in Ottawa;
- obtain supporting information or clarifications from BCHIL;
- in consultation with IDRC, establish standards for assessing efficiency of implementation in terms of schedule and budget;
- assess BCHIL's existing personnel and cost control systems for the SIHP-II;

- document and analyze the usefulness of existing reporting relationships between the Vancouver and the Lahore project offices, and between BCHIL and its sub-contractors (consultants);
- audit the reporting procedures to identify bottlenecks which create lag time and jeopardize BCHIL's ability to meet contractual requirements (in communications and reporting);
- describe and analyze the existing organizational and management systems of both BCHIL and WAPDA (note that this is not done with a view of reforming WAPDA's management, which is beyond the scope of this project, but rather to better understand the environment in which the SIHP-II must operate);
- assess the cross-cultural strategies of BCHIL's field personnel as defined in CIDA's publication prepared by Dr. D.J. Kealey;
- review, in consultation with the IDRC Training Advisor, the contribution of the training conducted to date in enhancing the professional capability of the SIHP-II staff and in meeting the objectives set out in the Training Plan;
- determine the level of technology adoption by WAPDA staff, as well as the point which must be reached to ensure sustainability in both operations and planning; and,
- with the accord of IDRC, carry out any other activity which is required to achieve the Evaluation's objectives.

4.2 Reports

The Canadian Evaluator will prepare a draft report of his/her activities, findings and recommendations in Pakistan and submit it to IDRC within two weeks of the conclusion of his/her trip to Pakistan. It is understood that the recommendations of the evaluation must be realistic, both in terms of budget and of the capabilities of BCHIL and WAPDA to implement them. The report must address all the points highlighted in the detailed terms of reference above, particularly aspects of the project that should be investigated in subsequent evaluations, standards for assessing efficiency of implementation in terms of schedule and budget, and any other points not included in these terms of reference which the Evaluator may wish to raise based upon his/her professional experience.

IDRC will review the draft report and endeavour to provide feedback to the Evaluator within three weeks. The Evaluator shall finalize the report within two weeks of receiving IDRC's comments.

Appendix B: Evaluation Work Plan

APPENDIX B.

WORK PLAN

For The

MID-PROJECT EVALUATION

OF

SNOW AND ICE HYDROLOGY PROJECT - PHASE II

PAKISTAN

(SIHP-II - 88-8009-04)

Prepared By:

Leo G. Wynnyckyj

September 20, 1993

TABLE OF CONTENTS

1. OVERVIEW OF THE PROJECT

1.1 Objectives and Responsibilities

a) The goal of the Project is to improve the water resources management capability of WAPDA in the context of the Upper Indus Basin (UIB) and to contribute to the food self-sufficiency and income generation, through water availability and power generation.

b) The purpose of the Project is to establish an improved hydro-meteorological information gathering system and to develop a flow forecasting model of the UIB from the improved data base. More specifically:

* To determine the stream forecasting needs of WAPDA for the UIB;

* To examine known and potential seasonal and short-term stream-flow forecasting systems as a function of WAPDA's operational needs; and,

* To select the best available model for stream-flow forecasting that will be adapted to meet WAPDA requirements.

c) The overall responsibility for management of CIDA inputs to the Project rests with IDRC. For effective coordination and management of the technical inputs to the Project IDRC has retained BCHIL as Executing Agency for the Project. IDRC has also signed a Memorandum of Grant Conditions (MGC) with the Government of Pakistan (GOP) which makes WAPDA responsible for the implementation of the Project in Pakistan with the assistance from BCHIL.

d) The primary focus of this mid-project evaluation will be on the effectiveness of the implementation process and on operational and institutional sustainability.

1.2 Project Background

Water for agricultural irrigation and electric power generation plays a vital role in the economy of Pakistan. Existing reservoirs are used to accumulate water reserves during periods of abundant flow for conservation and distribution administered by WAPDA.

The UIB covers an area of about 264,000 km^2 upstream of Tarbela Dam and including the Jhelum River system upstream of Mangla Dam. It is located in a mountainous region which has substantial snow cover as well as extensive glaciers. Between 70-80% of the water flow in the Indus River is generated by high altitude snow and ice melt.

WAPDA recognized the need to develop a rational system of water management for distribution that would improve agricultural production and hydro-electric power

generation. The first project requested by WAPDA from Canada was funded by IDRC and was carried out in cooperation with Wilfrid Laurier University of Waterloo. This project known as Snow and Ice Hydrology Project - Phase I (SIHP-I) on the high altitude hydrology of the UIB was completed in 1989.

WAPDA approached CIDA as a follow-up to the IDRC project. CIDA approved WAPDA's request and entrusted the overall responsibility for project management to IDRC. The implementation of the project was sub-contracted by IDRC to BCHIL. Under the contract BCHIL must work in close collaboration with WAPDA on all phases of the project so that Pakistan will be self-sustaining at the end of SIHP-II. Project activities started in October, 1990.

2. EVALUATION DESIGN

2.1 Issues to be Addressed in the Evaluation

The following areas of concern will constitute the primary focus of the evaluation:

1. **Operational Concerns**

   a) The degree to which BCHIL's implementation strategies for each project component strengthens WAPDA's capability to sustain the forecasting system at the project's completion, and within this assignment;

   b) The relative timeliness and cost-effectiveness of BCHIL's implementation strategies for each project component;

   c) The cost effectiveness of BCHIL's management practices in their implementation of the project;

   d) The extent to which WAPDA's current operational and institutional infrastructures will support the operation of SIHP-II's new flow forecasting method;

   e) Any unresolved problems encountered in the project implementation to date; and,

   f) Remedial action and/or restructuring of the project implementation to overcome existing problems (within the existing budget envelope).

   The evaluation will assess and report on the following factors affecting the effectiveness of the project and achievement of its objectives:

2. **Effectiveness Concerns**

a) BCHIL's existing personnel and control systems for the SIHP-II;

b) Usefulness of the existing reporting relationship between Vancouver and the Lahore project offices, and between BCHIL and its sub-contractors (consultants);

c) BCHIL's reporting procedures which create lag time and jeopardize BCHIL's ability to meet contractual requirements in communications and reporting;

d) The existing organizational and management systems of BCHIL and WAPDA and the operational environment of the SIHP-II;

e) The cross-cultural strategies of BCHIL's field personnel (as defined in CIDA's publication prepared by Dr. D.J. Kealey);

f) The training conducted to date to enhance the professional capability of the SIHP-II staff;

g) The level of technology adoption by WAPDA staff and the point which must be reached to ensure sustainability in planning and operations;

3. EVALUATION METHODOLOGY AND PROCEDURES

3.1 Data Collection Procedures

The data base for the evaluation will be assembled by way of a review and examination of IDRC files, reports of BCHIL, WAPDA, IDRC and personal interviews and discussions with knowledgeable persons during the three week visit to Pakistan.

The data base for the operational and effectiveness concerns will be assembled through detailed discussions with the officials of IDRC and CIDA in Canada and officials of BCHIL and WAPDA, members of the Project Review Committee in Pakistan and others with background knowledge of the project. (See Appendix "A" - Interview Guide).

3.2 Report Outline

The Report of the Evaluation will be organized around the following Table of Content. Other sections may be added as appropriate.

Table of Content

4. EVALUATION TIMINGS AND SCHEDULE

4.1	Review of Project files, reports; Interviews with officials of IDRC, CIDA and other persons with background knowledge of the Project; Review and update of the Work Plan;	Sept 1 - Sept 28, 1993
4.2	Field Mission to Pakistan Interviews and discussions with officials of IDRC, BCHIL, WAPDA, GOP, Canadian Embassy in Islamabad and other persons with background knowledge of the Project; Project Review Committee meeting;	Sept 29 - Oct 26, 1993
4.3	Drafting of Preliminary Report; Visit to Vancouver; interviews with officials of BCHIL; Preparation and submission of the Final Report;	Oct 27 - Dec 15, 1993

APPENDIX "A"

SNOW AND ICE HYDROLOGY PROJECT - PHASE II - PAKISTAN
MID-PROJECT EVALUATION

INTERVIEW GUIDE

(For interviews/discussions with persons with background knowledge of the Project)

Name _____ Date _____ Time _____

Office/Post Title _____ Location _____

(Operational Issues)

1.1 How appropriate/relevant is BCHIL implementation strategy to WAPDA's capability to sustain the forecasting system in:

a) Management _____

b) Technical Assistance:
* Installation and Maintenance

_____

_____

* Data collection, processing, interpretation

_____

_____

c) Procurement _____

d) Training _____

1.2 BCHIL's strategy's timeliness and cost effectiveness:

a) Management _____

b) Technical Assistance _____

c) Procurement _____

d) Training _____

1.3 BCHIL's management practices in project implementation.

_____

1.4 Will WAPDA be in position to implement SIHP-II forecasting systems/methods

_____

1.5 Any unresolved problems encountered in project implementation to date.

_____

1.6 Should there be any remedial action or project restructuring?

_____

(Effectiveness Issues)

2.1 How effective are BCHIL systems in SIHP-II Re:

Personnel _____

Control _____

2.2 BCHIL reporting systems and relationships:

* VANCOUVER Lahore project offices _____
* Sub-contractors/consultants _____

2.3 BCHIL's reporting procedures:

Time lags _____

2.4 BCHIL and WAPDA - operational environment/performance

_____

2.5 Cross-cultural strategies of BCHIL project team (Dr. D.J. Kealey)

_____

2.6 How adequate is the training carried out by BCHIL to enhance WAPDA professional capability?

_____

2.7 How high is the level of readiness of WAPDA staff to adopt the technology and ensure sustainability?

_____

2.8 Other comments or Issues _____

_____

Appendix C: List of Persons Consulted

1.	Ahmad, Nazir	WAPDA Communications Technologist
2.	Ali, Ghazmafar	WAPDA Research Officer, Modelling
3.	Akhtar, T.	WAPDA Engineer Modelling
4.	Adamcik, Renata	BCHIL, Project Management Assistant
5.	Afzal, Hasnain	WAPDA, Senior Engineer, S & I
6.	Anwar, M.	WAPDA, Senior Engineer - Construction
7.	Anwar, Naveed	WAPDA, Junior Engineer - Construction
8.	Aslam, M.	WAPDA, Communications/Maintenance Specialist
9.	Bell, Dr. Warren	BCHIL, Project Manager
10.	Bilal, G.	WAPDA, Data Management, Lab. Assistant
11.	Dufour, Sylvain	IDRC, Project Manager
12.	Foreman, E.	WAPDA, Construction & Maintenance Specialist
13.	Frank, Dean	CIDA, Former Asia Branch Project Officer
14.	George, Nancy	IDRC, Training Specialist
15.	Gossen, Rhonda	CIDA, Senior Development Officer, Asia Branch
16.	Hamid, A.	WAPDA, Computer Operations Specialist
17.	Hashmi, Daniel	WAPDA, Junior Engineer, Operations
18.	Hussain, Imriaz	WAPDA, Sub-Engineer, Data Management
19.	Ilyas, Mohammed	WAPDA, Hydrology Sub-Engineer
20.	Jackson, John	CIDA, Project Officer, Pakistan, Asia Branch
21.	Javaid, Muhammad	WAPDA, Data Management Specialist
22.	Khan, Anwar Ali	WAPDA, Senior Engineer, Telemetry
23.	Khan, Inamullah	WAPDA, Junior Engineer, Construction
24.	Kirch, Jim	CIDA, Water Specialist
25.	Mahood, Akhtar	WAPDA, Sub-Engineer, Construction
26.	Mahood, Sajid	WAPDA, Junior Engineer, Communications
27.	Munawi, Amoitiaz	WAPDA, Construction Engineer
28.	Masood, Tariq	WAPDA, Project Director (H&RD)
29.	Munir, M.A.	WAPDA, Research Officer, Modelling
30.	Nooruddin, Pervez	Canadian Embassy, Islamabad, Program Officer
31.	Parmley, Les	WAPDA, Hydrologist
32.	Qamar, javed, w.	WAPDA, general manager, planning
33.	Qasim, ghulam	WAPDA, sub-engineer, construction
34.	Qureishi, a.A.	WAPDA, maintenance engineer
35.	Rehman, I.	WAPDA, Electronic Foreman
36.	Reinhardt, Danielle	IDRC, Technical Assistant
37.	Thomson, Bill	BCHIL, Site Manager
38.	Usmani, Muntasir	WAPDA, Maintenance Engineer
39.	Walk, Heiki	WAPDA, Hydrologist
40.	Warsi, M. Saleem	WAPDA, Chief Engineer (H&WM)

Appendix D: Summary of Data Gathered through Interviews

Subject		Statements made by those interviewed (as per interview guide - Appendix "a")
1.1	Appropriateness of BCHIL's strategy to WAPDA's capability to sustain the forecasting system:	1. Fully appropriate; nothing lacking; 2. Sufficiently appropriate; 3. Very good; 4. Good (9);
	a) management;	5. Satisfactory (2); 6. Appropriate; 7. No information (3);
	b) technical assistance;	1. Installation strategy worked fine; installation and maintenance undergoing testing; 2. Good (10); very good (2); 3. More specific training required in "installation" and hydrological aspects; 4. Fair; 5. Need more details on calibration of the ubc model; 6. Appropriate; 7. No information;
	c) procurement	1. Fully relevant; 2. Good (6); very good (4); 3. Appropriate; 4. No information (6);
	d) training	1. Appropriate (4); 2. Training is not satisfactory (4); 3. Good (7); 4. No information (3);
1.2	BCHIL's strategy's timeliness and cost-effectiveness	1. No delays; strategy cost effective; 2. Good (7); very good (4); 3. Some initial problems;
	a) management	4. No information (5);

	b) technical assistance	1. Appropriate 2. Should be improved; 3. Good (7); very good (1); 4. Fair (3); 5. Is required in the calibration; 6. No information (4);
	c) procurement	1. No delays; 2. Good (12); very good (1); 3. Satisfactory; 4. No information (3);
1.3	BCHIL's management practices in project implementation;	1. Excellent 2. Good (8); very good (2) 3. Sufficiently reasonable; 4. No information (6)
1.4	Will WAPDA be able to implement the SIHP forecasting systems/-methods;	1. Yes (12) 2. Yes - if it follows BCHIL practices 3. No - mainly because of financial constraints (2); 4. I think so (2) 5. With strong supervision and control;
1.5	Any unresolved problems in the project implementation to date;	1. None (9) 2. Poor management on WAPDA's side (2) 3. Data decoding, calibration needs more explanation (3); 4. Dealt with as they arise; 5. Not significant; 6. Suitable kits not provided (2);
1.6	Should there be project restructuring;	1. WAPDA management should be improved; 2. Improved site selection; more on site operators training (4); 3. No information (13);
2.1	Effectiveness of BCHIL systems in SIHP-II - personnel/control	1. Totally effective (2) 2. Good (11); very good (3); 3. Satisfactory; 4. No information;

2.2	BCHIL's reporting systems/relationships - Vancouver/Lahore offices; sub-consultants	1. Totally effective (2); 2. Good (8); very good (4); 3. No information (2);
2.3	BCHIL's reporting procedures; time lags;	1. No time lags; good; (3) 2. Good (9); 3. No information (6);
2.4	BCHIL/WAPDA operational performance	1. Excellent 2. Good communications/understanding; 3. Good (8); very good (2); 4. Satisfactory (2); 5. No information (4);
2.5	BCHIL cross-cultural strategies (dr. D.J. Kealey)	1. Satisfactory; 2. Good (4) 3. No information (13);
2.6	BCHIL training to enhance WAPDA capability	1. Fully adequate 2. Training in progress, ok so far; 3. Not adequate (2) 4. Not satisfactory for sub-engineers (4) 5. Good 3; very good 2; 6. No information 5;
2.7	WAPDA readiness to adopt technology and ensure sustainability	1. Top level readiness (3); 2. Good (6); very good (2) 3. Substantial improvement - last 6 months 4. Additional training for sub-engineers 5. No information (5);
2.8	Other comments/issues	1. System is very good; 2. There should be more emphasis on training (8); 3. No comment (9);

In spite of the difficulties identified earlier about the questionnaire, the results were not compiled with some analysis. This information is virtually useless — and in some respects, quite misleading. One does not know the level of the staff making some of the observations, nor the context within which certain statements have been offered.

IDRC Comments on Appendix D.